Quadratic Formula

The quadratic formula is used to find the x-intercepts (also called zeros or roots) of a quadratic equation.

The quadratic equation **must** be equal to 0 in order to solve for the x-intercepts.

$ax^2+bx+c=0$ ← Quadratic Equation

$$x=\frac{-b\pm\sqrt{(b)^2-4ac}}{2a}$$ ← Quadratic Formula

Ex: Solve $4x^2+12x=-7$

$+7 \quad +7$

$4x^2+12x+7=0$

$a=4 \quad b=12 \quad c=7$

$$x = \frac{-1(+12) \pm \sqrt{(+12)^2 - 4(4)(7)}}{2(4)}$$

$$x = \frac{-1(12) \pm \sqrt{144 - 4(4)(7)}}{2(4)}$$

$$x = \frac{-12 \pm \sqrt{144 - 112}}{8}$$

$$x = \frac{-12 \pm \sqrt{32}}{8}$$

$$x = \frac{-12}{8} \pm \frac{\sqrt{32}}{8}$$ ← must simplify the radical

$$x = -\frac{3}{2} \pm \frac{4\cdot\sqrt{2}}{8}$$

$$x = -\frac{3}{2} \pm \frac{\sqrt{2}}{2}$$

$$x = \frac{-3 \pm \sqrt{2}}{2}$$

Ex: Different solutions

$$x = \frac{6 \pm \sqrt{3}}{2}$$ (2 irrational roots)

$$x = \frac{6 \pm 7}{4}$$ (2 rational roots)

$$x = \frac{6+7}{4} \text{ or } \frac{6-7}{4}$$

$$x = \frac{13}{4} \text{ or } \frac{-1}{4}$$

$$x = \frac{-6 \pm \sqrt{-128}}{4}$$ (No real solution)